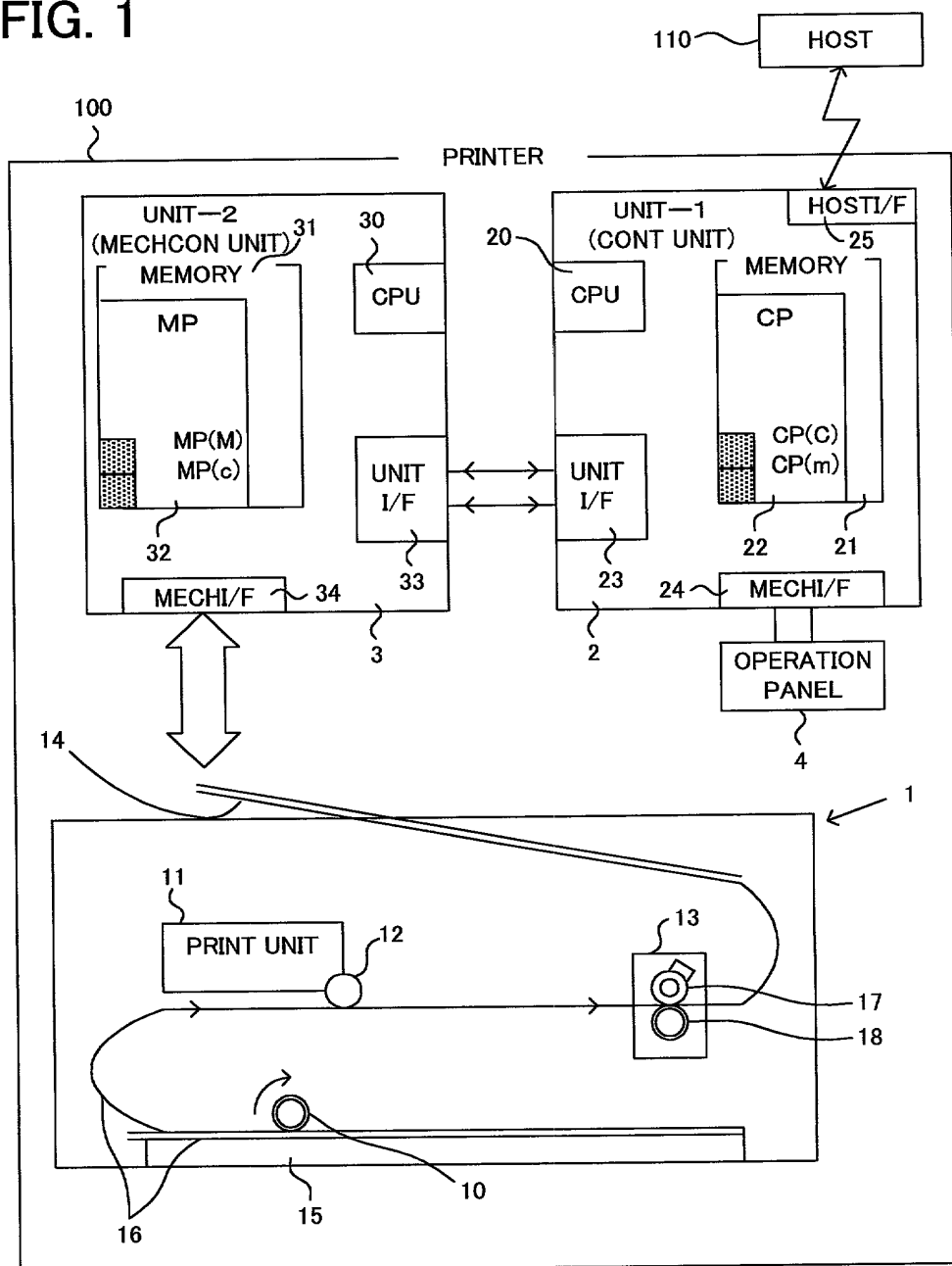# FIG. 1

FIG. 2

CP(C)=VERSION DATA OF CP ITSELF

CP(m)=MP SUPPORT VERSION DATA
(NEWEST VERSION DATA OF MP TO BE SUPPORTED BY CP)

MP(M)=VERSION DATA OF MP ITSELF

MP(c)=CP SUPPORT VERSION DATA
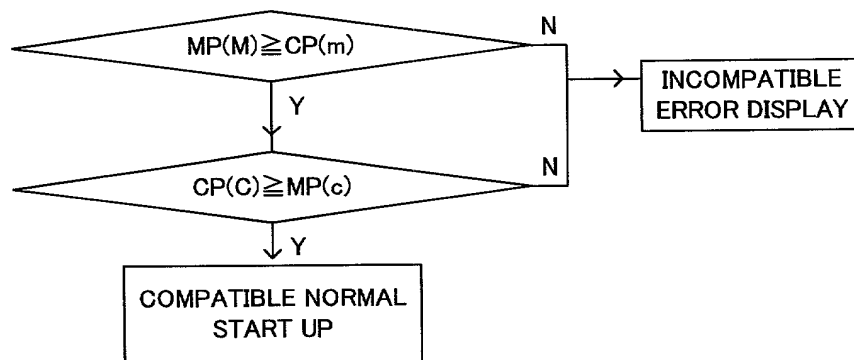(NEWEST VERSION DATA OF CP TO BE SUPPORTED BY MP)

FIG. 3

FIG. 4

[HISTORIC VERSION OF PRINTER]

VERSION	UNIT／CONTROL PROGRAM VERSION
1ST VERSION	MECHCON UNIT：MP(M)＝V01L01 　　　　　　　MP(c)＝MORE V01L01 CONT UNIT　　：CP(C)＝V01L01 　　　　　　　CP(m)＝MORE V01L01
2ND VERSION	SUBSTITUTE MECHCON DUE TO FAILURE
	MECHCON UNIT：MP(M)＝V02L01 　　　　　　　MP(c)＝MORE V01L01 CONT UNIT　　：CP(C)＝V01L01 　　　　　　　CP(m)＝MORE V01L01
3RD VERSION	SUBSTITUE MECHCON AND CONT DUE TO FUNCTION ENHANCE
	MECHCON UNIT：MP(M)＝V03L01 　　　　　　　MP(c)＝MORE V02L01 CONT UNIT　　：CP(C)＝V02L01 　　　　　　　CP(m)＝MORE V03L01

CASE1：IN 2ND VERSION PRINTER, MECHCON UNIT IS SUBSTITUTED TO MP(M)＝V01L01
　　　　$CP(C) \geq MP(c)$IS
　　　　0101 $\geq$0101, OK

　　　　$MP(M) \geq CP(m)$IS
　　　　0201 $\geq$0101,OK AND NORMAL START UP

CASE2：IN 3RD VERSION PRINTER, MECHCON UNIT IS SUBSTITUTED TO MP(M)＝V02L01
　　　　$CP(C) \geq MP(c)$IS
　　　　0201 $\geq$0101, OK

　　　　$MP(M) \geq CP(m)$IS
　　　　0201 $\geq$0301, AND ERROR INDICATION

FIG. 5
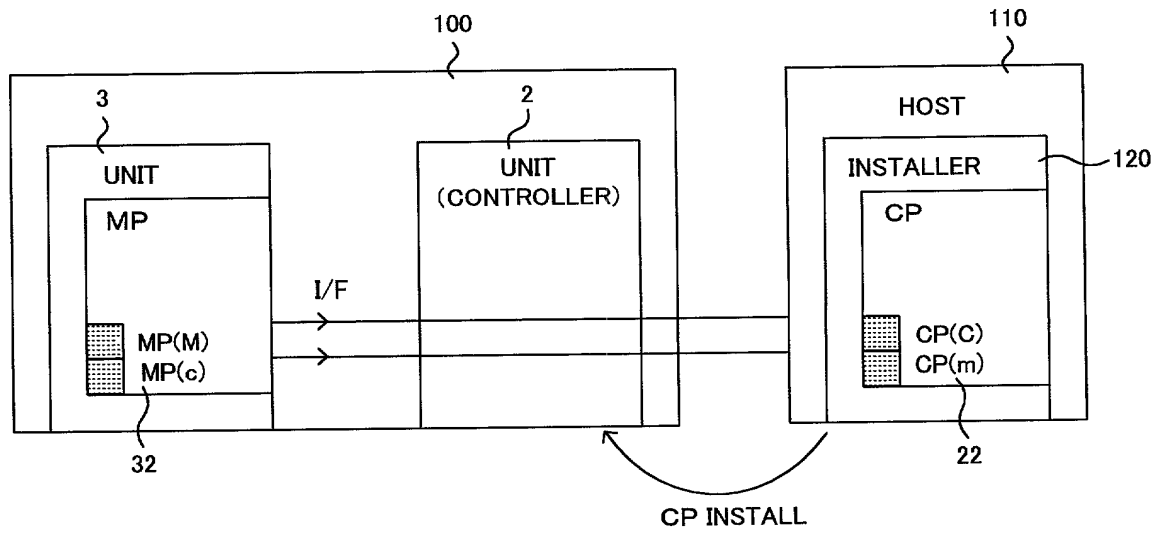
FIG. 6

MU(M)＝VVLL(VERSION DATA OF MU)

MU(c)＝CU SUPPORT VERSION DATA

CU(m)＝MU SUPPORT VERSION DATA

CU(c)＝CU VERSION DATA
            (＝vvll)

FIG. 7A

```
        ┌─────────────────────────┐  N
  ──────<    MU VERSION UP?        >──────────────────────┐
        └─────────────────────────┘                       │
                     │ Y                                   │
        ┌─────────────────────────┐  N                     │
  ──────<   MB, MP COMPATIBLE?     >──────────────┐         │
        └─────────────────────────┘               │         │
                     │ Y                           │         │
            ┌──────────────┐          ┌──────────────┐       │
            │   LL=+1       │          │   VV=+1       │──────┘
            └──────────────┘          └──────────────┘
                     │                        │
                     └────────────────────────┘
            ┌──────────────┐
            │   MU=VVLL     │
            └──────────────┘
```

FIG. 7B

```
        ┌─────────────────────────┐  N
  ──────<    CU VERSION UP?        >──────────────────────┐
        └─────────────────────────┘                       │
                     │ Y                                   │
        ┌─────────────────────────┐  N                     │
  ──────<   CB, CP COMPATIBLE?     >──────────────┐         │
        └─────────────────────────┘               │         │
                     │ Y                           │         │
            ┌──────────────┐          ┌──────────────┐       │
            │   ll=+1       │          │   vv=+1       │──────┘
            └──────────────┘          └──────────────┘
                     │                        │
                     └────────────────────────┘
            ┌──────────────┐
            │   CU=vvll     │
            └──────────────┘
```

FIG. 8

CU(C) $\geqq$ MU(c) — N → INCOMPATIBLE ERROR INDICATION

Y

MU(M) $\geqq$ CU(m) — N

Y

COMPATIBLE NORMAL START UP
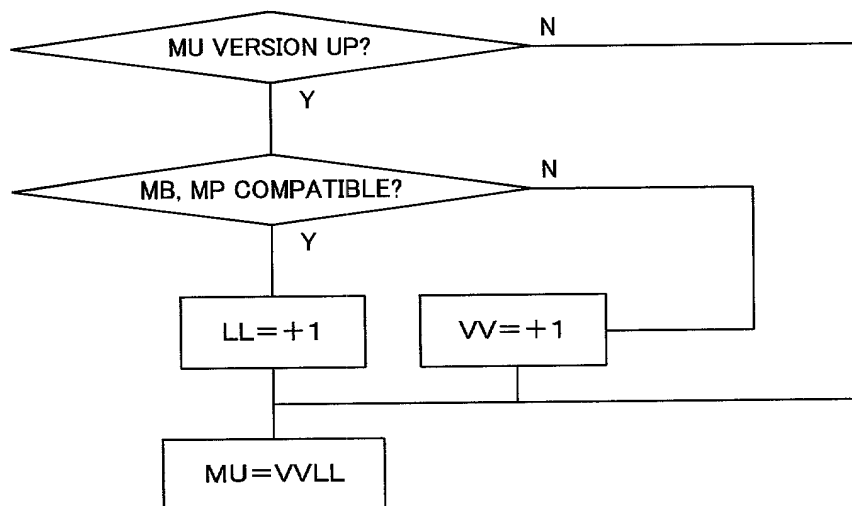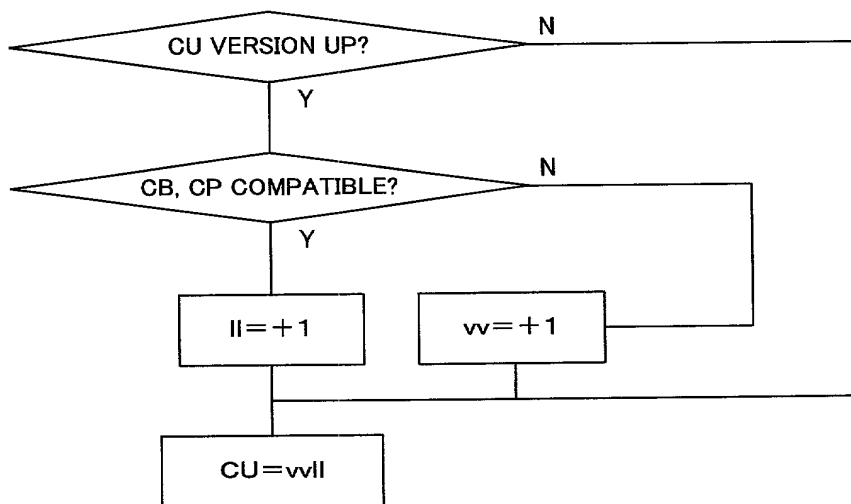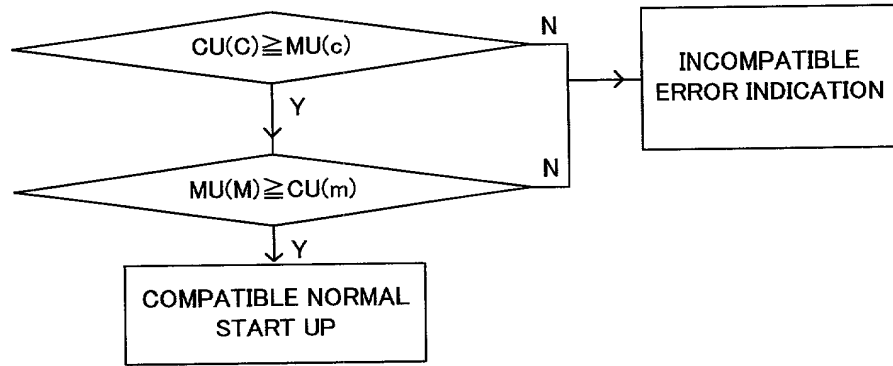
FIG. 9

[HISTORIC VERSION OF PRINTER]

VERSION	UNIT／CONTROL PROGRAM VERSION
1ST VERSION	MECHCON UNIT：MU(M)＝V01L01 　　　　　　　　MU(c)＝MORE V01L01 CONT UNIT 　:CU(C)＝V01L01 　　　　　　　　CU(m)＝MORE V01L01
2ND VERSION	MECHCON BOARD AND CONTROL PROGRAM ARE SUBSTITUTED DUE TO MECH BOARD FAILURE
	MECHCON UNIT：MU(M)＝V01L02 　　　　　　　　MU(c)＝MORE V01L01 CONT UNIT 　:CU(C)＝V01L01 　　　　　　　　CU(m)＝MORE V01L01
3RD VERSION	MECHCON BOARD AND CONTROLLER BOARD ARE SUBSTITUTED DUE TO FUNCTION ENHANCE
	MECHCON UNIT：MU(M)＝V02L01(V UP) 　　　　　　　　MU(c)＝MORE V02L01 CONT UNIT 　:CU(C)＝V02L01(V UP) 　　　　　　　　CU(m)＝MORE V02L01

CASE1：IN 2ND VERSION PRINTER, MECHCON UNIT IS SUBSTITUTED TO MU(M)＝V01L01
　　　　CU(C)≧MU(c) IS
　　　　0101 ≧0101, OK

　　　　MU(M)≧CU(m) IS
　　　　0101 ≧0101, OK AND NORMAL START UP

CASE2：IN 3RD VERSION PRINTER, MECHCON UNIT IS SUBSTITUTED TO MU(M)＝V01L02
　　　　CU(C)≧MU(c) IS
　　　　0201 ≧0201, OK

　　　　MU(M)≧CU(m)IS
　　　　0102 ≧0201, NG AND ERROR INDICATION

CASE3：IN 2ND VERSION PRINTER, CONTROLLER UNIT IS SUBSTITUTED TO CU(C)＝V02L01
　　　　CU(C)≧MU(c) IS
　　　　0201 ≧0101, OK

　　　　MU(M)≧CU(m) IS
　　　　0102 ≧0201, NG AND ERROR INDICATION

FIG. 10

MECHCON UNIT 3

CONTROLLER/
MECHCON INTERFACE

CONTROLLER UNIT2

S1 ┌─ START CONTROL PROGRAM ─┐

┌─ START CONTROL PROGRAM ─┐

VERSION DATA RESPONSE PROCESS(FIG. 12)
- RECEIVE MECHCON VERSION REQUEST
- RESPOND MECHCON VERSION (MvMI)
- RECEIVE SUPPORT VERSION REQUEST
- RESPOND SUPPORT VERSION(CvCI)

MP(M)req →

← MP(M)res

MP(c)req →

← MP(c)res

VERSION DATA RESPONSE PROCESS (FIG. 12)
- REQUEST MECHCON VERSION
- GET MECHCON VERSION (MvMI)→MP(M)
- REQUEST SUPPORT VERSION
- GET SUPPORT VERSION cvcl→MP(c)
- SET CONTROLLER VERSION CvCI→CP(C)
- SET SUPPORT VERSION mvml→CP(m)

S2 **COMPATIBILLTY VERIFICATION PROCESS (FIG. 13)**

$CP(C) \geqq MP(c)$ — Y / N

$MP(M) \geqq CP(m)$ — Y

S3 **START UP PROCESS (FIG. 13)**
- RECEIVE COMPATIBILITY
- NORMAL START UP PROCESS
- REPORT COMPLETION OF NORMAL START UP
  - RECEIVE INCOMPATIBILITY
  - RESPOND INCOMPATIBILITY

← CKinf(OK)

MPstart →

← CKinf(NG)

CKres →

VERIFICATION RESULT REPORT / START UP PROCESS (FIG. 13)
- REPORT COMPATIBILITY
- RECEIVE NORMAL START UP OF MECHCON
- START CONTROL PROGRAM (HOST COMMUNICATION ANABLE)
  - REPORT INCOMPATIBILITY
  - RECEIVE INCOMPATIBILITY

FIG. 11

(1)   (2)   (3)

S4

AUTOMATIC MP CHANGE PROCESS

- RECEIVE VERSION HISTORY REQUEST
- RESPOND VERSION HISTORY (RvRI)

- RECEIVE START UP VERSION REQUEST
- RESPOND START UP VERSION (KvKI)

MP(R)req

MP(R)res

MP(K)req

MP(K)res

AUTOMATIC CP CHANGE PROCESS
- REQUEST VERSION HISTORY
- GET VERSION HISTORY RvRI→MP(R)
- REQUEST START UP VERSION
- GET START UP VERSION KvKI→MP(K)
- SET VERSION HISTORY RvRI→CP(R)
- SET START UP VERSION KvKI→CP(K)

S4-2

LEVEL UP PROCESS

INITIALIZE MP(K),MP(M)

INIT

S4-1

LEVEL UP/DOWN DETERMINATION PROCESS

MP(R)>MP(K) N / Y

CP(R)>CP(K)

S4-3   N

LEVEL UP VERSION
INITIALIZE CP(K),CP(C)

S4-4

VERSION DATA RESPONSE PROCESS

- RECEIVE MECHCON VERSION REQUEST
- RESPOND MECHCON VERSION (MvMI)

- RECEIVE SUPPORT VERSION REQUEST
- RESPOND SUPPORT VERSION (cvcl)

MP(M)req

MP(M)res

MP(c)req

MP(c)res

S4-5

VERSION DATA GET PROCESS
- REQUEST MECHCON VERSION
- GET MECHCON VERSION MvMI→MP(M)
- REQUEST SUPPORT VERSION
- GET SUPPORT VERSION cvcl→MP(c)
- SET CONTROLLER VERSION CvCI→CP(C)
- SET SUPPORT VERSION mvml→CP(m)

S4-6

LEVEL DOWN PROCESS

MI=01   N

Y

Mv=-1   MI=-1

MP(M)=MvMI

COMPATIBILITY VERIFICATION PROCESS

N

CP(C)≧MP(c)

Y

MP(M)≧CP(m)   Y

N

LEVEL DOWN PROCESS

CI=01   N

Y

Cv=-1   CI=-1

CP(C)=CvCI

FIG. 12

S10

POWER ON

PROCESS OF MP | PROCESS OF CP

```
START UP MECHCON          START UP CONTROLLER
PROGRAM                   PROGRAM
```

S11

```
START RESPOND             START GET PROCESS
PROCESS OF VERSION        OF VERSION
DATA
```

```
                          REQUIRE MECHCON
                          VERSION
```

N ⟵

REQUIREMENT OF VERSION DATA ⟵ N

S14

N ⟶ **RESPONSE OF VERSION DATA**

Y

```
RESPOND MECHCON           SET VERSION DATA
VERSION DATA (MvMI)       MP(M)=MvMI
```

S12

Y

```
                          REQUIRE SUPPORT
                          VERSION DATA          N
```

REQUIREMENT OF SUPPORT VERSION DATA N ⟶

S15

RESPONSE OF SUPPORT VERSION DATA N ⟶

Y

```
RESPOND SUPPORT VERSION   SET SUPPORT VERSION
DATA                      DATA          MP(c)=cvcl
```

```
                          GET CONTROLLER
                          VERSION            S13
```

Y

```
END OF RESPOND
PROCESS
```

```
SET VERSION DATA
CP(C)=CvCl
```

```
GET SUPPORT VERSION
DATA
```

```
SET SUPPORT VERSION
DATA          CP(m)=mvml
```

```
END OF GET PROCESS
```

FIG. 13

PROCESS OF MP

```
┌────────────────────┐                          ┌──────────────────────┐
│     START UP        │ S22                      │   PROCESS OF CP      │ S20
└────────────────────┘                          └──────────────────────┘
         │                                                  │
         │                                       ┌───────────────────┐         N    ┌──────────────────┐
         │                                       │  CP(C)≧MP(c)       ├──────────────│  INCOMPATIBILITY │
         │                                       └───────────────────┘              └──────────────────┘
         │                                                  │ Y                              │
         │                                       ┌───────────────────┐         N             │
         │                                       │   MP(M)≧CP(m)      ├──────────────┐        │
         │                                       └───────────────────┘              │        │
         │                                                  │ Y                      │        │
         │                                       ┌───────────────────┐              │        │
         │                                       │   COMPATIBILITY   │◄─────────────┘◄───────┘
         │                                       └───────────────────┘
         │                                       ┌─────────────────────────┐
         │                                       │  END OF VERIFY PROCESS  │
         │                                       └─────────────────────────┘
         │                                       ┌─────────────────────────┐
         │                                       │    REPORT/START UP      │ S21
         │                                       └─────────────────────────┘
         │                                                  │
         │        ┌──────────────────────────┐             │                N
         │        │                          │   ┌─────────────────────┐
         ▼◄───────┤                          │   │    COMPATIBILITY    ├──────────┐
┌─────────────────────┐     N                │   └─────────────────────┘          │
│   NOTIFICATION OF   ├──────────────────────┘             │ Y                    │
│   VERIFIED RESULT   │                       ┌──────────────────┐   ┌──────────────────┐
└─────────────────────┘                       │     REPORT       │   │     REPORT       │
         │ Y                                   │  COMPATIBILITY   │   │  INCOMPATIBILITY │
         │                                     └──────────────────┘   └──────────────────┘
         │                                     ┌──────────────────┐   ┌────────────────────────┐
         │                                     │   CP NORMAL      │   │  PROCEED TO MP         │
         │                                     │   START UP       │   │  AUTOMATIC SHANGE      │
┌─────────────────────┐                        └──────────────────┘   │  PROCESS(FIG. 14)      │
│   NOTIFICATION OF   │        N                        │              └────────────────────────┘
│   COMPATIBILITY     ├─────────┐                       │
└─────────────────────┘         │            ┌──────────────────────────┐
         │ Y                     │            │  END OF REPORT /START UP │
┌──────────────────┐            │            └──────────────────────────┘
│   MP NORMAL      │            │
│   START UP       │            │
└──────────────────┘            │
         │            ┌────────────────────────┐
┌──────────────────┐  │  PROCEED TO MP         │
│  END OF START UP │  │  AUTOMATIC CHANGE      │
└──────────────────┘  │  PROCESS(FIG. 14)      │
                      └────────────────────────┘
```

FIG. 14

MP

S32
(START OF RESPONSE)

REQUIREMENT OF HISTORIC VERSION — N
Y

RESPOND HISTORIC VERSION (RvRI)

REQUIREMENT OF START UP VERSION — N
Y

RESPOND MECHCON START UP VERSION (KvKI)

(END OF PROCESS)

S34
INITIALIZE INSTRUCTION — N
Y

INITIALIZE MECHCON VERSION

IN STEP S36 IN FIG. 15

CP

(START OF GET) S30

REQUIRE HISTORICAL VERSION

RECEIVE HISTORICAL VERSION — N
Y

SET HISTORICAL VERSION MP(R)=RvRI

REQUIRE START UP VERSION — N

RECEIVE START UP VERSION

SET START UP VERSION MP(K)=KvKI

S31

GET CONT HISTORICAL VERSION

SET HISTORICAL VERSION CP(R)=RvRI

GET CONT START UP VERSION

SET START UP VERSION CP(K)=KvkI

(END OF GET)

S33
(LEVEL UP/DOWN START)

MECH LEVEL UP PROCESS

MP(R) > MP(K) — Y → INITIALIZE CONT VERSION
N

CONT LEVEL UP

CP(R) > CP(K) — Y → INITIALIZE CONT VERSION
N

(END OF LEVEL UP/DOWN)

IN STEP S35 IN FIG. 15

FIG. 15

START RESPOND PROCESS OF VERSION DATA — S36

REQUIREMENT OF VERSION DATA — N / Y

RESPOND MECHCON VERSION DATA(MvMl)

REQUIREMENT OF SUPPORT VERSION DATA — N / Y

RESPOND SUPPORT VERSION DATA(cvcl)

END OF RESPONSE

START GET PROCESS OF VERSION DATA — S35

REQUIRE MECHCON VERSION

RESPONSE OF VERSION DATA — N / Y

SET VERSION DATA MP(M)=MvMl

REQUIRE SUPPORT VERSION DATA

RESPONSE OF SUPPORT VERSION DATA — N / Y

SET SUPPORT VERSION DATA MP(c)=cvcl

GET CONTROLLER VERSION

SET VERSION DATA CP(C)=CvCl

GET SUPPORT VERSION DATA

SET SUPPORT VERSION DATA CP(m)=mvml

END OF GET PROCESS

START OF VERIFY — S37

CP(C) ≧ MP(c) — N → INCOMPATIBILITY → INSTRUCT LEVEL DOWN → S38

Y

MP(M) ≧ CP(m) — S39 — Y → COMPATIBIRITY

N

INCOMPATIBILITY — S40

END OF VERIFY

CP(K)=CP(C) MP(K)=MP(M)

REPORT/START UP (STEP S21 IN FIG. 13)

START LEVEL DOWN — S38

MI = 01 — MI = −1 / N

Mv = −1 — Y

MP(M) = MvMl

END OF LEVEL DOWN

START LEVEL DOWN

CI = 01 — CI = −1 / N

Cv = −1 — Y

END OF LEVEL DOWN

CP(C) = CvCl

FIG. 16

MECHCON UNIT 3   CONTROLLER UNIT 2

| V02L01 | | V02L01 |

BEFORE SUBSTITUTION MECHCON

↓
↓
↓
↓
↓

| V01L01 |

AFTER SUBSTITUTION MECHCON

| V02L01 |

↓
↓
↓
↓
↓

AFTER CHANGE CONTROL PROGRAM

| V02L01 |
| V01L02 |
| V01L01 |

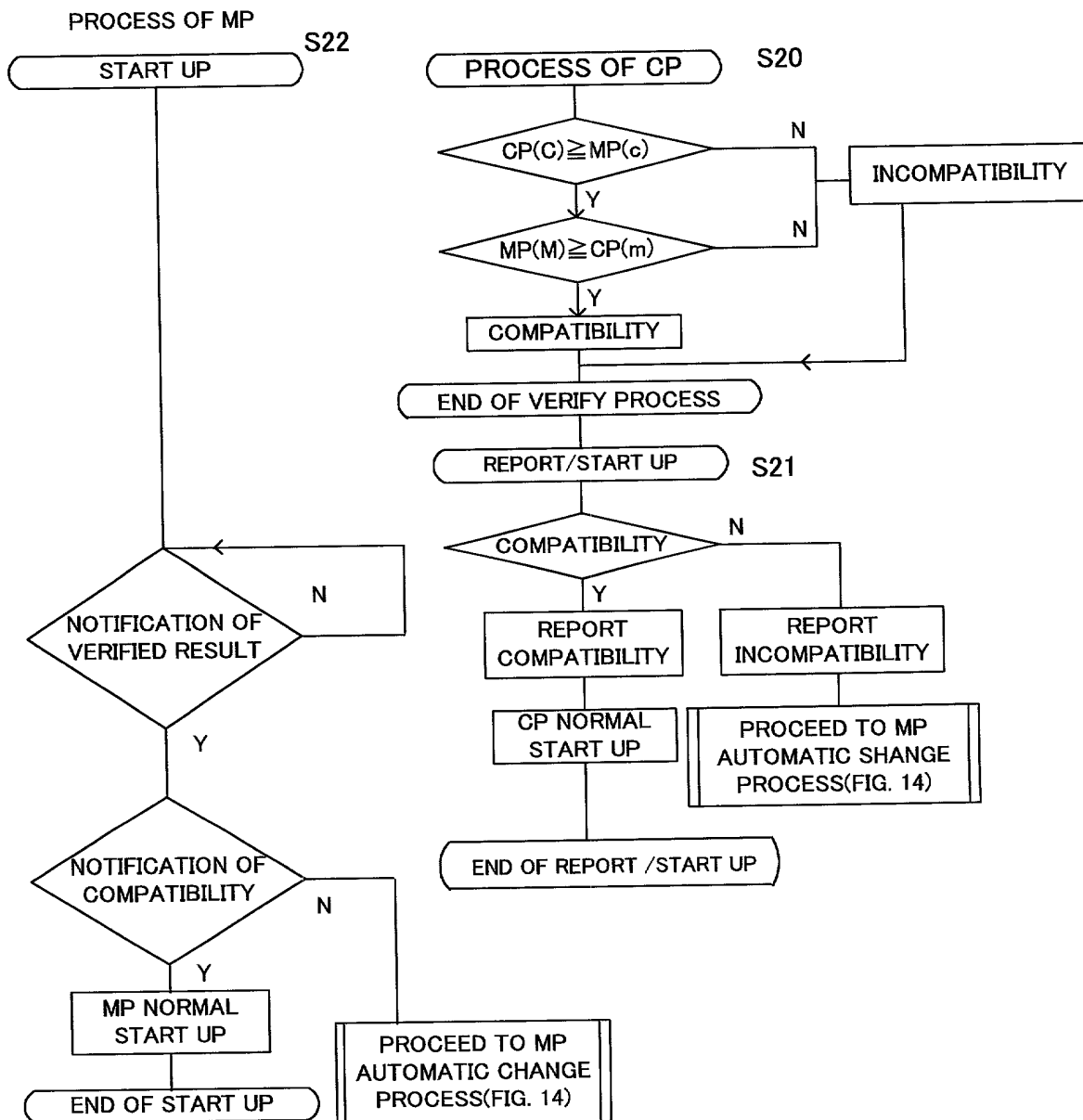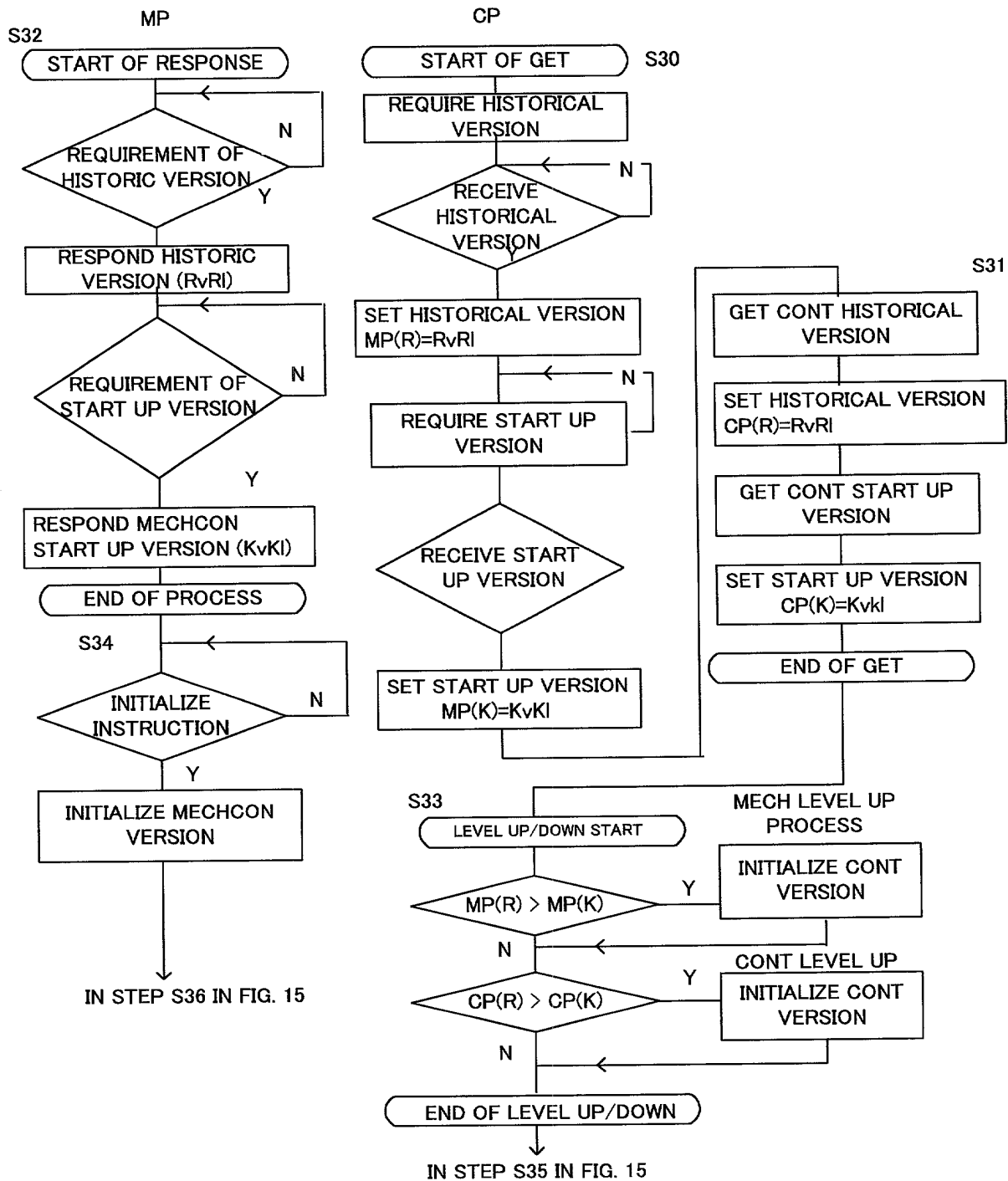| V01L01 |

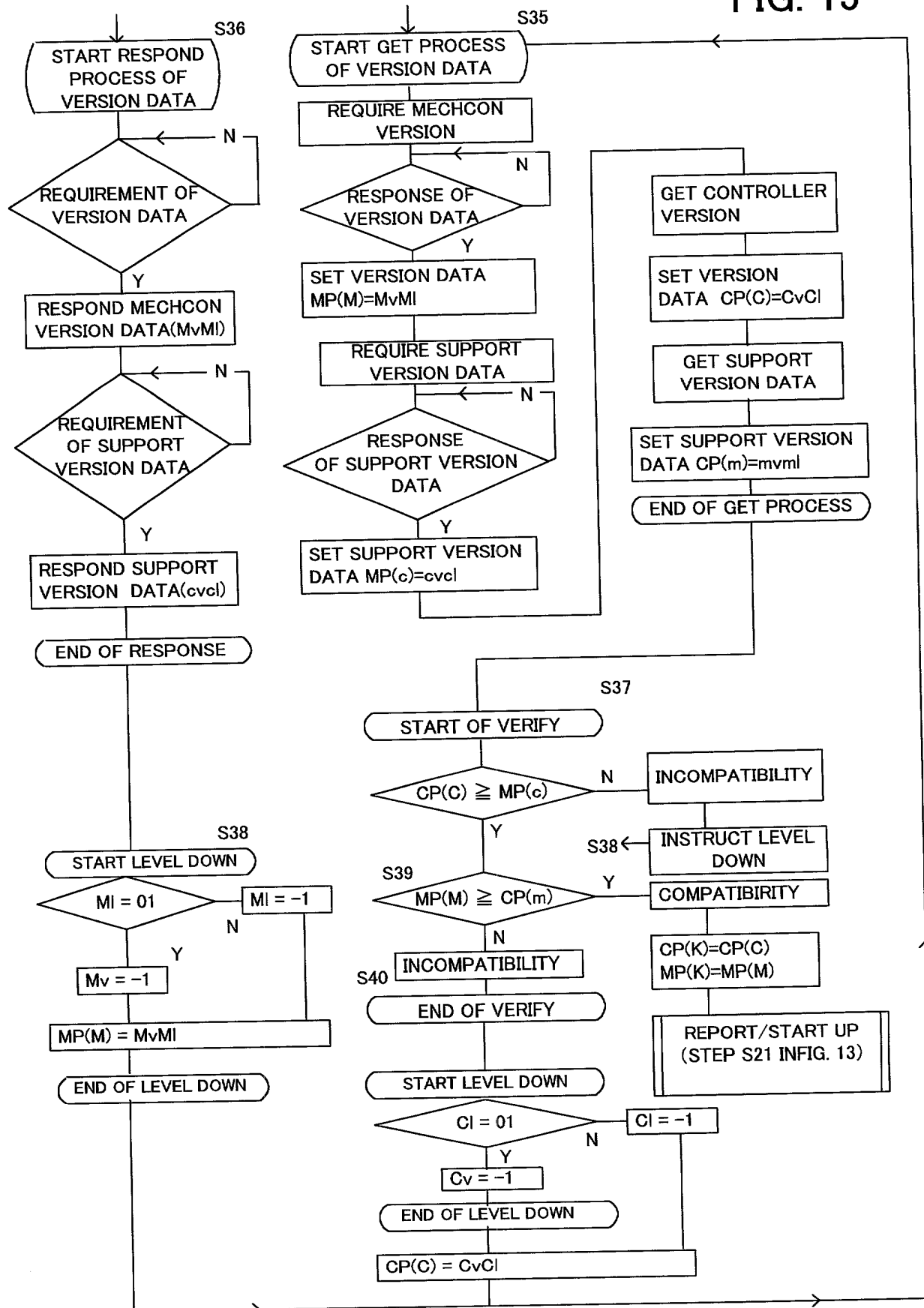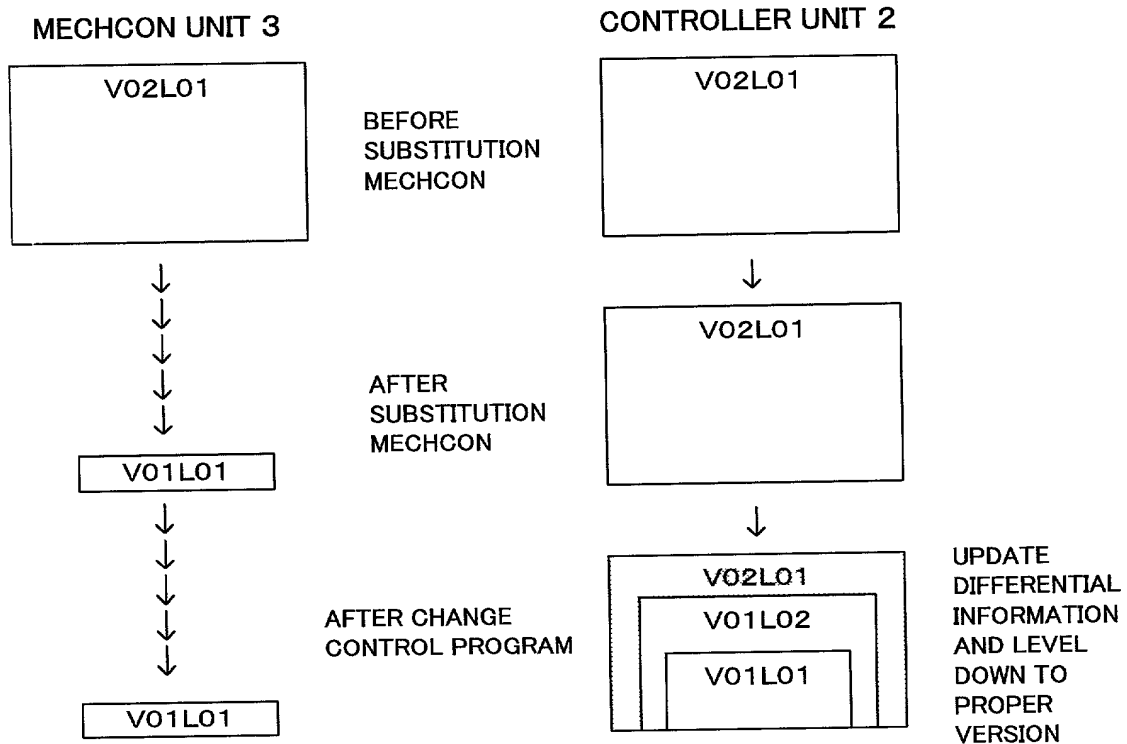UPDATE DIFFERENTIAL INFORMATION AND LEVEL DOWN TO PROPER VERSION

FIG. 17

INITIAL VALUE AFTER MECHCON UNIT SUBSTITUTION
    CONTROL PROGRAM VERSION : $MP(M)=V01L01$、$MP(c)=V01L01$
    VERSION HISTRY   : $MP(R)=V01L01$
    START UP VERSION   : $MP(K)=V01L01$
INITIAL VALUE OF CONTROLLER UNIT
    CONTROL PROGRAM VERSION : $CP(C)=V02L01$、$CP(m)=V02L01$
    VERSION HISTRY   : $CP(R)=V02L01／V01L02／V01L01$
    START UP VERSION   : $CP(K)=V02L01$
VALUE OF CONTROLLER UNIT AFTER MECHCON UNIT SUBSTITUTION
    CONTROL PROGRAM VERSION : $CP(C)=V01L02$、$CP(m)=V01L02$
    VERSION HISTRY   : $CP(R)=V02L01／V01L02／V01L01$
    START UP VERSION   : $CP(K)=V01L02$
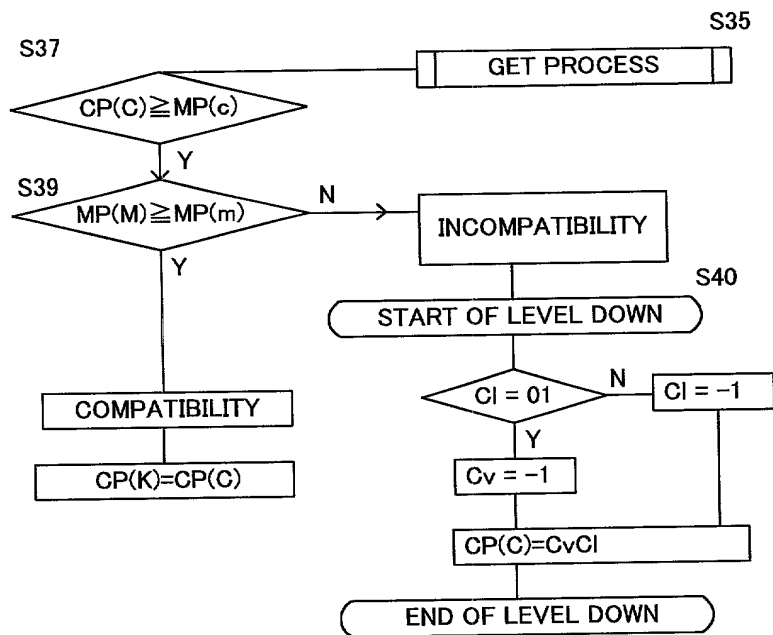
FIG. 18

S35 GET PROCESS

S37 CP(C)≧MP(c) — Y

S39 MP(M)≧MP(m) — N → INCOMPATIBILITY

START OF LEVEL DOWN S40

CI = 01 — N → CI = −1

Y

COMPATIBILITY

CP(K)=CP(C)

Cv = −1

CP(C)=CvCI

END OF LEVEL DOWN

FIG. 19

BEFORE SUBSTITUTION

```
┌─────────────────────┐
│ V02L01              │
│ ┌─────────────────┐ │
│ │ V01L02          │ │
│ │ ┌─────────────┐ │ │
│ │ │ V01L01      │ │ │
│ └─┴─────────────┴─┘ │
└─────────────────────┘
```

┌──────────────┐
│ V01L01   │
└──────────────┘

↓

```
┌─────────────────────┐
│ V02L02              │
│ ┌─────────────────┐ │
│ │ V02L01          │ │
│ │ ┌─────────────┐ │ │
│ │ │ V01L02      │ │ │
│ │ │ ┌─────────┐ │ │ │
│ │ │ │ V01L01  │ │ │ │
│ └─┴─┴─────────┴─┴─┘ │
└─────────────────────┘
```

AFTER
MECHCON
SUBSTITU
TION

↓

↓
↓
↓

```
┌─────────────────────┐
│ V02L01              │
│ ┌─────────────────┐ │
│ │ V01L02          │ │
│ │ ┌─────────────┐ │ │
│ │ │ V01L01      │ │ │
│ └─┴─────────────┴─┘ │
└─────────────────────┘
```

↓
↓
↓

```
┌─────────────────────┐
│ V02L02              │
│ ┌─────────────────┐ │
│ │ V02L01          │ │
│ │ ┌─────────────┐ │ │
│ │ │ V01L02      │ │ │
│ │ │ ┌─────────┐ │ │ │
│ │ │ │ V01L01  │ │ │ │
│ └─┴─┴─────────┴─┴─┘ │
└─────────────────────┘
```

AFTER
VERIFY
COMPATIBILI
TY OF
CONTROL
PROGRAM

```
┌─────────────────────┐
│ V02L01              │
│ ┌─────────────────┐ │
│ │ V01L02          │ │
│ │ ┌─────────────┐ │ │
│ │ │ V01L01      │ │ │
│ └─┴─────────────┴─┘ │
└─────────────────────┘
```

UPDATE DIFFERENTIAL
INFORMATION TO LEVEL
UP

FIG. 20

START UP DETERMINATION
LEVEL UP/DOWN

RESET EACH VERSION OF UNIT

MP(R) > MP(K) — Y

N

CP(R) > CP(K) — Y

N

END OF DETERMINATION

MP(M)＝V02L02
MP(c)＝V02L02
MP(K)＝V02L02
CP(C)＝V02L01
CP(m)＝V02L01
CP(K)＝V02L01

S35   GET PROCESS

S37   CP(C) ≧ MP(c) — N → INCOMPATIBIRITY   S38

Y

S39   MP(M) ≧ CP(m)

Y

START OF LEVEL DOWN

MI–01 — N → MI = –1

Y

Mv = –1

MP(M)–MvMI

END OF LEVEL DOWN

COMPATIBILITY

MP(K)=MP(M)